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ABSTRACT

Most research on scaffolded instruction has been conducted with mothers rather than fathers and has carried the implicit assumption that it is superior to other methods. This study examined fathers' teaching style differences and the effects of those differences on children's recall and transfer of a strategy for solving balance scale problems. Participating were 11 father-daughter and 9 father-son dyads. Children ranged in age from 9 to 12 years. Two balance scales were used during instruction, one with four pegs to each side of the fulcrum, and one with 10 pegs to each side. During a laboratory session, fathers completed a questionnaire regarding his aspirations for his child and his involvement in his child's life. Prior to the teaching phase, fathers' understanding of the mathematical rule for solving balance problems was verified. The teaching interaction was videotaped. Following the interaction, children received a posttest of 4-peg problems to test strategy maintenance and were also posttested for transfer on a 10-peg scale and for far transfer using problems presented on paper. Teaching style was defined by the change over time in the proportion of words spoken by the father and child. The findings indicated that fathers were highly variable in the amount of time they took to teach the strategy, as well as in their teaching style. All fathers were equally effective in teaching the strategy to their children. A high correlation was found between frequency of help with homework and efficiency of teaching. (Contains 22 references.) (KB)

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In Search of Scaffolding: An Observational Study of Fathers' Informal Instructional Styles

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Poster presented at the Biennial Meeting of the Society for Research in Child Development, April 15-18, 1999, in Albuquerque, New Mexico.

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Abstract

The differences in teaching styles employed by fathers and the effects of these differences on children's recall and transfer of a strategy for solving balance scale problems were assessed. It was found that fathers are highly variable in the amount of time they take to teach the strategy, as well as in their teaching style as defined by change over time in the proportion of words spoken by the father and child. All fathers were equally effective in teaching the strategy to their children, as all children in the study did learn it. A high correlation was found between frequency of help with homework and efficiency of teaching. The findings suggest that a variety of teaching styles can be equally effective, but that scaffolding may provide an advantage where transfer of performance is concerned.

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Psychological theories of cognitive development have traditionally focused on maturation and the individual's role in his or her own development, while de-emphasizing the contributions of the social context of development. As the child does not grow up isolated from social influences, the investigation of such influences and how they affect child development seems appropriate. In recent years, the attention of developmental psychologists has increasingly turned to the social context of intellectual development. Significant improvements in the intellectual performance of children due to interaction with peers and adults have been demonstrated in several recent studies (Campione, Brown, Ferrara, & Bryant,1984; Day & Cordón, 1994; Ellis & Rogoff,1986; Gauvain & Rogoff,1985; Frankel & Rollins,1984; Rogoff, Ellis,& Gardner, 1984; Rogoff & Gauvain,1985; Rogoff, Malkin, & Gilbride, 1984). A major factor in this surge of interest in the study of the role of interaction was the publication in English of Vygotsky's (1978) theory of cognitive development.

Vygotsky's theory centers around the concept of the "zone of proximal development", the difference between a child's actual level of development and his/her potential level of development. Vygotsky's proposed way of measuring the zone is by observing the level of problems a child can correctly complete alone and then observing what the child is capable of in collaboration with an adult or more adept peer. Vygotsky proposes that children develop higher mental abilities through interactions with adults, in which more responsibility for performing a task is gradually ceded to the child by the adult as the child's ability increases (Vygotsky, 1978). Implicit in Vygotsky's theory is the idea that the instruction will be adjusted to fit what the teacher perceives as the child's level of ability. Wood, Bruner, and Ross (1976) have described this process as well, using the term "scaffolding" to refer to this style of instruction, a name which has grown tremendously in popularity as a

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description of Vygotsky's instruction in the Zone of Proximal Development. Scaffolding has been operationalized as a learning process in which the adult externalizes the behavior to be learned, reduces the "cognitive workload" for the child by taking responsibility for those parts of the task the child cannot yet do, and slowly cedes control of the task to the child as the child becomes more skilled (Day, Cordón, & Kerwin, 1989; Day & Cordón, 1994).

Researchers have attempted to verify that people do, indeed, teach children as Vygotsky and Wood et al. (1976) suggested. Typically, an observational methodology is used; behaviors are recorded as an adult tries to help a child solve some problem (e.g., prepare for a memory test, complete a puzzle). Mothers and their preschool children are usually the subjects (eg., McGillicuddy-DeLisi, 1982, 1985; McGillicuddy-DeLisi, DeLisi, Flaugber, & Sigel, 1987; McGillicuddy-DeLisi, Sigel, & Johnson, 1979; Sigel, 1982) although occasionally fathers (e. g., Barton & Ericksen, 1981; Frankel & Rollins, 1983), older siblings (Cicirelli, 1967, 1972, 1973, 1976), or other adults (e. g., Childs & Greenfield, 1980; Wood et al., 1976) are asked to teach and sometimes school-age children are taught (e.g., Rogoff, Ellis, & Gardner, 1984). These observational studies tend to take two general forms. One is to provide an ethnographic interpretation of an ongoing instructional interaction (eg., Cazden, 1981; Cazden, Cox, Dicldnson, Steinberg, & Stone, 1979; Gardner & Rogoff, 1982; McNamee, 1979; Mehan, 1979). The other is to examine how the frequencies of general classes of instructional behavior (e. g., number of directives or questions) change with children's age or experience. Most of this work has been cross-sectional (Childs & Greenfield, 1980; Greenfield, 1984; Wertsch, 1979; Wertsch, McNamee, Budwig, & McLane, 1980), although a few longitudinal studies have been published (Adams, 1987; Adams, Sartore, & Bunock, 1988; Heckhausen, 1987; Hodapp, Goldfield, & Boyatzis, 1984; Rogoff, Malldn, & Gilbride, 1984).

T'he data obtained from studies of instructional interactions are, as with most observations of human interaction, rich, complex, complicated, and dfffficult to summarize and/or quantify. Determination of what behaviors to code is problematic, especially since the meaning of a particular behavior can vary with the context. In addition, it is dfffficult to develop a coding scheme that is both sufficiently fine-grained to capture the nuances of human interaction and can be used reliably, and that produces large enough frequencies in each category to allow meaningful statistical analyses. These problems are exacerbated when the looked-for behaviors are subtle ones such as providing a scaffold for children to practice nascent skills, and reducing support as children develop competence. How are we to determine, for instance, that an adult provided just enough and not too much assistance? How are we to know that the child is practicing nascent skills and not ones that have already been internalized? How can we show that the adult ceded control quickly enough? A review of research on this area (Day et al., 1989) showed very little uniformity in the operational definitions used by different researchers, yet there was remarkable consistency in the degree to which researchers were able to demonstrate the basic processes of scaffolded instruction. In nearly all studies reviewed, however, the dyads observed consisted of children and their mothers (Day et al., 1989).

Most research on scaffolded instruction has carried the implicit assumption that scaffolded instruction, when it occurs, is a superior teaching method (Day et al., 1989; Cordón & Day, 1993; Cordón, 1997). One study has actually experimentally compared scaffolded instruction to another style often observed in parents, and the results were rather intriguing (Day & Cordón, 1994). The competing teaching method was one identified by Wood, Wood, and Middleton (1978) as the "swing strategy", and appears to be also fairly typical of ways in which parents teach their children. Children in the study were able to learn a balance scale strategy when

taught by either method, but transfer of the learned strategy to novel situations was far better among the children taught by the scaffolded technique (Day & Cordón, 1994).

Why include Fathers?

The differential treatment of sons and daughters by fathers should affect their teaching styles with their children, and the limited literature available on the subject demonstrates this. Barton and Ericksen (1981) compared the teaching styles of fathers and mothers and found that fathers asked less questions and used more statements and non-verbal instructions than mothers, but they found no effect based on the sex of the child. Frankel and Rollins (1983) found, in a study similar to the work of Barton & Ericksen (1981), no difference in the way mothers and fathers taught a memory task, but substantial differences occurred based on the child's sex. Parents were more directive and more approving or disapproving with sons, and they used more strategy behaviors than specific behaviors with their sons. Daughters received more feedback than sons, and parents used more specific, concrete behaviors than strategy behaviors with daughters. There was no difference in memory performance by gender, and both groups improved substantially on the memory task as a result of the interaction. This indicates that both parents taught the child just as effectively, thus again indicating the importance of further study of fathers as teachers.

In the present study the goal is to test the effects of teaching style, sex of child, father's involvement in childrearing, father's expectations for the child, and various demographic factors on the father's effectiveness in teaching the child. The task used is a balance scale task, selected because of the ease of assessing a subject's performance level due to the invariant sequence of strategy levels involved in solving problems on the scale (Siegler, 1976). As originally conceived, this study

was to involve a considerably larger sample than was actually obtained, and so the original hypotheses could not be tested with acceptable statistical power. The present study therefore represents a work in progress, with sample size expected to grow substantially in the second half of 1999, as a grant has been secured allowing the project to grow considerably.

Method

Subjects.

Twenty father-child dyads have participated in the study thus far, of which 11 have included daughters and 9 included sons. The children ranged in age from 9 to 12 years. Both fathers and children signed informed consent forms prior to participating.

Materials

Two different balance scales were used: One with four pegs to each side of the fulcrum, and one with 10 pegs to each side. A twelve-item questionnaire was administered to the fathers prior to the interaction, and another questionnaire was administered following the interaction.

Procedure. Each father-child dyad was seen in a laboratory, in a single session. The session consisted of four distinct phases: pretest, instruction, maintenance, and generalization. In the pretest phase, the child was pretested using only 4-peg scale problems, to determine his/her level of rule use (Siegler,1976). During this phase, the father filled out a questionnaire which measured his aspirations for his child's education, his involvement in his child's life, and other variables. Prior to the second phase, the father received a written copy of the proper mathematical rule for solving balance problems, along with spoken instructions to verify that he understood the rule. In the second phase the father was asked to teach his child the

rule the way he would noormally teach a school-like problem. The entire instructional interaction was videotapped, with the full cooperation of both the parent and the child. The father was instructeed to stop this phase when he felt either that his child had learned the rule or that itit was appropriate to terminate the teaching sessíon.

In the third phasee, the child received a posttest made up of 4-peg problems to test maintenance of thhe strategy.

During the final ¡ phase, the child was posttested for transfer on a ten-peg balance scale. The childd was then tested for far transfer using a series of problems which were presented onn paper rather than on an actual scale. During this phase, the father filled out a questitionnaire about his impressions of the instructional interaction (Appendix B).

Results and Discussion

Description of the sampple. The fathers had a mean level of education of eighteen years, with all but 5 havving obtained at least a master's degree. All were college graduates, and all but onne (95 %) reported an annual income of over $40,000. On a seven-point scale, wheree 7 indicates the highest level of school performance, the fathers' mean expectatioon for their children's school achievement was 6. On the same scale, with 4 at thee midpoint to indicate "average", fathers rated their expectations as compareed to those of other fathers, with a mean rating of 5.6.

Test Performance. On ı the pretest, all children were using either rule I or rule, and so any advance in rule uuse on later tasks is a result of the teaching interaction. On the four-peg post-test, ahll of the children used rule IV consistently, which shows that at that point they had allll learned the rule. On the remaining transfer tasks, all but two of the subjects contitinue to exhibit consistent use of rule IV.

The consistency of performance among the children is further illustrated by Table 1, in which it can be seen that once a child had been taught the rule, his/her performance, measured in terms of percentage of correct responses, remained substantially higher than it had been on the pretest. When rule use is the criterion by which learning is assessed, all of the fathers appear to have been effective teachers.

Measures of teaching.

In order to distinguish different styles of teaching, each interaction was broken into episodes. A new episode begins each time the balance scale is manipulated in order to set up a new problem or example. The mean number of episodes was 12.5, but individual scores on this measure ranged from 6 to 41. Total amount of time required was also highly variable, ranging from a four-minute interaction to a 43-minute session, with a mean time of 11.59 minutes. This demonstrates once again the highly variable nature of the fathers' teaching styles, all of which were effective in teaching the balance scale strategy.

Table 1

Length of interaction and percentage scores on all tests

Subject	Length (minutes)	# of episodes	Pretest	Posttest	10-peg	Paper
01	6.75	9	.611	.944	.944	1.00
02	5	10	.389	1.00	1.00	1.00
03	7.25	7	.389	1.00	1.00	.944
04	43.0	41	.389	1.00	.833	.444
05	10	11	.611	1.00	.833	.944
06	8.5	9	.611	1.00	1.00	1.00
07	4	7	.666	1.00	.944	1.00
08	8.25	6	.389	.889	.833	.944
09	7.75	10	.611	.944	.944	1.00
10	5	10	.389	1.00	1.00	1.00
11	7.25	8	.389	1.00	1.00	.944
12	20.5	12	.389	1.00	.833	.666
13	13	15	.611	1.00	.833	1.00
14	9.5	10	.611	1.00	1.00	1.00
15	5	8	.666	1.00	.944	.944
16	8.25	6	.389	.889	.833	.944
17	7.25	10	.611	.833	.944	1.00
18	6	11	.389	1.00	1.00	1.00
19	9.25	9	.389	1.00	1.00	.944
20	16	13	.389	1.00	.833	.666

Specific influences on instructional effectiveness.

In order to test the hypothesis that fathers who spend more time with their children will be more effective teachers, a Pearson product-moment correlation was computed between the fathers' self-report of how much time they spent with their children each week and the total amount of time they took to teach the strategy. No relationship was found between the two variables ($r = 6.89 \times 10^{-11}$). Another

correlation coefficient was computed between total teaching time and the fathers' self-report of how often they help their children with homework, however, and a high degree of relationship was found ($r = -.7548$), thus showing that the fathers who helped their children more often required less time to teach them something new.

The efficiency of the teaching process is obviously affected by aspects of the participants and their relationship, but fathers who went about teaching in very different and variable manners were able to teach the correct strategy. This can be best illustrated by focusing on the two most extreme cases. In order to measure the transfer of responsibility over the course of the interaction, the proportion of words (and, by inference, responsibility and control of the interaction) spoken by the father was calculated for each episode of each interaction. A highlight of the data so far: The father whose interaction took longest appears to have retained a high level of control throughout the interaction, whereas the father who taught the strategy the quickest appears to have allowed his child more freedom within the activity. In the seventh episode of the shortest interaction, the father's proportion of verbalization dropped down to below .30. In the seventh episode in of the longest interaction observed, on the other hand, the father is still controlling the interaction, with over .90 of the verbalizations. It also should be noted that the less controlling father was working with his son, while the most controlling (and least efficient) father was working with a daughter. This is consistent with what has been previously reported in the literature (Frankel & Rollins, 1983; Lamb, 1981; Peters & Stewart, 1981), but the sample size is too small to warrant any firm conclusions on sex differences in this area.

Conclusions. While these results indicate that there is fairly wide variability in the specifics of teaching interactions, and in their time efficiency, it is important to note

that all of the children learned the strategy. In terms of the post-test results, which should be the final criterion of whether learning took place, no teacher was more effective than any other. Much has been written in recent years to suggest that there exists an optimal teaching style for this sort of interaction which is more effective than others (See Wood, Bruner, & Ross, 1976). The present data suggest otherwise, by showing that fathers may vary widely on several dimensions and still be effective as teachers. It should be noted, however, that some of the fathers are clearly far closer to the scaffolding ideal than others, and my own prior research suggests that the real advantage of scaffolded instruction lies in transfer performance (Day & Cordón, 1994; Cordón, 1997). As a larger sample is collected, it will become possible to explore this relationship more closely. Meanwhile, individual cases in the present study suggest such a pattern. In the two extreme cases depicted above, for example, the child whose father took the longest time in the interaction, and whose pattern perfectly matched the "swing strategy" described by Wood et al., also exhibited the worst near and far transfer performance in the sample, whereas the child whose father took the shortest time to teach the strategy, and showed excellent support and responsiveness, also displayed perfect performance on the transfer tasks.

The sample used in this study is too small and homogeneous to generalize broadly, and yet it is that very homogeneity which makes these results important. Within a small group of similarly educated and affluent fathers, the range of effective teaching styles is remarkably variable. This suggests a far broader range of methods within the larger population. The project is continuing, and I expect to have data on over 50 dyads before the year is over, thus allowing far more elaborate examination of the data.

References

Aberle, D.F. & Naegele, K.D. (1952). Middle-class fathers' occupational role and attitudes. American Journal of Orthopsychiatry,22, 366-378.

Barton, K. & Ericksen, L.K. (1981). Differences between mothers and fathers in teaching style and child-rearing practices. Psychological Reports,49, 237-238.

Campione, J.C., Brown, A. L., Ferrara, R.A., & Bryant, N.R. (1984). The zone of proximal development: implications for individual differences and learning. In Rogoff, B, & Wertsch, J.V.,Children's learning in the "zone of proximal development",(pp.77-92). San Francisco: Jossey-Bass.

Cordón, L.A. (1997). In search of scaffolding: An investigation of fathers' informal instructional styles. Paper presented at the annual meeting of the Eastern Psychological Association, Washington, D.C., April 1997.

Day, J.D., & Cordón, L. A. (1993). Static and dynamic measures of ability: An experimental comparison. Journal of Educational Psychology, 85(1), 75-82.

Ellis,S., & Rogoff, B. (1986). Problem solving in children's management of instruction. In Mueller, E., & Cooper, C., Process and outcome in peer relationships. New York: Academic Press.

Frankel, M.T., & Rollins, H.A. (1983). Does mother know best? mothers and fathers interacting with preschool sons and daughters. Developmental Psychology, 19(5), 694-702.

Gauvain, M., & Rogoff, B. (1985). The development of planning skills by individuals and dyads. Presented at biennial meeting of the Society for Research in Child Development, Toronto, Canada.

Klinman, D.G. (1986). Fathers and the educational system. In Lamb, M.E., The father's role: applied perspectives(pp.413-428). New York: Wiley.

Lamb, M.E. (1981). Fathers and child development: an integrative overview. In Lamb, M.E., The role of the father in child development. New York: Wiley.

Lamb, M.E. (1986). The changing roles of fathers. In Lamb, M. E.(ed.), The father's role: applied perspectives (pp3-28). New York: Wiley.

Lewis, M., Feiring, C., & Weinraub, M. (1981). The father as a member of the child's social network. In Lamb, M.E., The role of the father in child development. (pp.259-294). New York: Wiley.

Peters, D. L., & Stewart, R.B. (1981). Father-child interactions in a shopping mall: a naturalistic study of father role behavior. The Journal of General Psychology,138,269-278.

Radin, N. (1981). The role of the father in cognitive, academic, and intellectual development. In Lamb, M.E., The role of the father in child development (pp.379-427). New York: Wiley.

Radin, N., & Russell, G. (1983). Increased father participation and child development outcomes. In Lamb, M.E., & Sagi, A., Fatherhood and family policy(pp.191-218). Hillsdale: Erlbaum.

Radziszewska, B., & Rogoff,B. (1985). Influence of adult and peer collaborators on the development of children's planning skills. Unpublished manuscript.

Rogoff, B. (1984). Adult-assistance of children's learning. In Raphael, T.E., & Reynolds, R.E., Contexts of literacy. New York: Longman.

Rogoff, B.,, Ellis, S., & Gardner, W. (1984). Adjustment of adult-child interaction accordiing to child's age and task. Developmental Psychology, 20(2), *193-199.*

Rogoff, B..,& Gauvain, M. (1985). Analysis of functional patterns in mother-child instructionall interaction. In Vaisiner, J.,The role of the individual subject in scientific psycholcogy. New York: Plenum.

Rogoff, B.., Malkin, C., & Gilbride, K. (1984). Interaction with babies as guidance in develcopment. In Rogoff, B., & Wertsch, J.V., Children's learning in the "zone of proximall development" San Francisco: Jossey-Bass.

Siegler, R.. (1976). Three aspects of cognitive development. Cognitive Psychology, 4,4811-520.

Wood, D. J., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem solving. Journal cof Child Psychology and Psychiatry, 17, 89-100.